

components are formed simultaneously on a common substrate during fabrication stages, even if the substrate is subsequently separated into subunits. For instance, wiring, memory or logic gates may be assembled into integrated circuits on the surface of a semiconductor wafer and then cut into individual dies. Examples of dies include microelectronic devices implemented on semiconductor materials, superconductors bearing Josephson Junctions, and materials bearing other quantum interference devices.

- 10 Individual dies are typically mounted into "Level 1" packages, which provide mechanical stability, protection, cooling and heat dissipation, power and grounding, and interconnection of signal lines (including clocking) to other packages. Examples include DIP, ceramic, surface mounted and socketed packages.

- 15 A "Level 2" package is a module carrying one or more Level 1 or Level 0 packages and interconnecting their signal and power wiring. It typically comprises a printed circuit board (PCB), a printed wiring board (PWB), or a thermal conduction module, and may cluster one or more interconnected packages for these purposes. "Level 3" assemblies further organize the Level 1 and Level 2 packages, typically with backplanes, but do not differ conceptually from Level 2 or Level 1 packages. The "Level 4" package canonically ties together the lower level packages with power supplies, environmental systems, mechanical systems, peripherals, and so forth to provide system functionality.

- A multichip module ("MCM" or "Level 1 1/2" package) provides modular functionality as a Level 2-like or Level 3-like package for holding and interconnecting multiple dies and/or associated interconnections.
- 30 At a minimum, an MCM provides the signal distribution, and power is usually distributed by way of the MCM as well. The MCM may also, or merely, encapsulate its constituent dies as an erstwhile Level 1 or Level 0 package, thereby providing protection. It may also communicate the dies to a heat sinking substrate, thereby providing heat
- 35 dissipation.